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# IMPACT OF APPLE CIDER VINEGAR ON DIFFERENT BIOMARKERS, FOR REDUCING TYPE 2 DIABETES MELLITUS CONDITION

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***ABSTRACT***

***Diabetes Mellitus has become a major public health problem, across the world and is associated with enormous personal, social and economic burden. Diabetes mellitus is a group of metabolic disorders, characterized by hyperglycaemia, resulting from defects in insulin secretion insulin action or both. In Type II Diabetes, either the body does not produce enough insulin or the cells ignore it. Apple cider vinegar is fermented juice from crushed apples. Like apple juice, it likely contain some pectin, vitamin b1, vitamin b2, and vitamin b6, biotin, folic acid, niacin pantothenic acid and vitamin c, in addition to oral hypoglycaemic drugs and the dietary component, such as apple cider vinegar seems to be promising for glycemic control in patient with Type 2 diabetes, as well as for diabetes related medical conditions. The study was conducted for two month with 90 individuals, with type II Diabetes patients and divided randomly in to three equal groups are as Apple Cider Vinegar group (n=30),control group (n=30) and Diabetic group (n=30). There was a significantly decrease in LDL, Triglyceride, Blood glucose levels and HbA1c. Conclusion, This study shows that, apple cider vinegar has significantly reducing effect on different biomarkers in type II Diabetic Mellitus condition.***

***KEYWORDS: Apple Cider vinegar, Diabetes, LDL, Hyperglycaemia & HbA1c***

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Original Article

## INTRODUCTION

Diabetes Mellitus has become a major public health problem, across the world and associated with enormous personal, social and economic burden. Diabetes mellitus is a group of metabolic disorders characterized by hyperglycaemia, resulting from defects in insulin secretion insulin action or both. In Type II Diabetes, either the body does not produce enough insulin or the cells ignore it. Type II Diabetes Mellitus describes a metabolic disorder of multiple aetiology characterized by chronic hyperglycaemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both. Millions of people around the world have been diagnosed with Type II Diabetes, and many more remain undiagnosed. People with diabetes are at a greater risk of developing cardiovascular diseases such as heart attack and stroke if the disease is left undiagnosed or poorly controlled. They also have elevated risks for sight loss, foot and leg amputation due to damage to the nerves and blood vessels, and renal failure requiring dialysis or transplantation. Apple cider vinegar is fermented juice from crushed apples. Like apple juice, it likely contain some pectin, vitamin b1, vitamin b2, and vitamin b6, biotin, folic acid, niacin pantothenic acid and vitamin c, in addition to oral hypoglycaemic drugs the dietary component such as apple cider vinegar seems to be promising for glycemic control in patient with Type II diabetes, as well as for diabetes related medical conditions. There is interest in using apple cider vinegar (ACV) to

patients with the experimentally induce diabetes, significantly reduces haemoglobin A1C (HbA1C), lower density lipoprotein (LDL), cholesterol and triglycerides and increase high density lipoprotein (HDL) cholesterol. In another patient model, apple cider vinegar decreased triglycerides and very low density lipoprotein (VLDL) cholesterol. Acetic acid in vinegar also seems to suppress disaccharides activity and increase glucose-6 phosphate levels in skeletal muscle.

Apple cider vinegar may interfere with enzymes that break down carbohydrate, allowing carbohydrate to pass through the body without being absorbed. Apple cider vinegar plays an important role in controlling the sugar levels in the blood. Might slow the absorption of carbohydrate in to the blood, or slow the breakdown of starches into sugars.

## OBJECTIVE

- To compare and find out impact of Apple Cider Vinegar on the different biomarkers of type 2 Diabetes Patient.

## METHODOLOGY

Present study to find out the impact of Apple Cider Vinegar in patients with Diabetes. A total respondent selected from SGPGI and INDRA DIAGONSTIC in Lucknow city survey method, adopted for the collection of data. A total of 90 patients with type 2 Diabetes were selected to respondents in study.60 type II subjects aged 30-60 years of both sexes, with the range of HbA1c 6-8%, LDL levels between 130-159mg/dl, HDL levels in men between 40-50 mg/dl and in women 50-60 mg/dl were selected, for the study. Respondents were personally interviewed with the help of pre structured survey questionnaire. General information such as age, sex, educational status, work pattern, income level, and type of family were collected from the questionnaire. Respondents fill the format of questionnaire. Apple cider vinegar was purchased from local market Then Apple Cider Vinegar was given to them for consumption for a period of 2 months 15ml was recommended before meals. The study was conducted for two months with 60 individual with type II Diabetes. The experiment group was- Group A (n=30) - control group, no intervention.

## RESULT AND DISCUSSIONS

**Group B (n=30)**: Diabetic group, also no intervention only taken for comparison between control group and vinegar group.

**Group C (n=30)**: Vinegar group, consumption of apple cider vinegar from 2 months.

Than taken the Diabetic patient's Report as sample for known Blood Glucose Level, HbA1c & Lipid Profile to Check the before starting of treatment. After the completion of 2 month, again collect same patient's biochemical report for analysis of impact of apple cider Vinegar.

**Table1: Baseline Distribution Table of Biochemical Test**

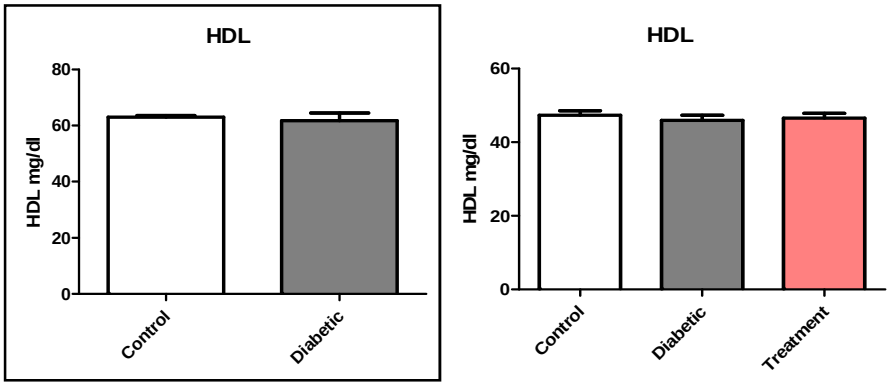
| Group | N | HDL Gm/Dl (Mean±S.D.) | LDL Gm/Dl (Mean±S.D.) | Triglyceride Gm/Dl (Mean±S.D.) | Hba1c G/Dl (Mean±S.D.) | Blood Glucose (Mean± S.D) |
|---|---|---|---|---|---|---|
| **Control(A)** | 30 | 63.03±.53 | 102±2.77 | 146.9±1.75 | 5.04±0.08 | 98.33±2.7 |
| **Diabetic(B)** | 30 | 61.80±2.70 | 115±2.70 | 170.7±6.23 | 5.51±0.06 | 165±5.95 |

Table 1 shows the result of biochemical parameters such as HDL, LDL, Triglyceride, HbA1c, blood glucose levels of the participants during the study.

**Table 2: After 60 Days Distribution Table of Biochemical Test**

| Group | N | HDL Gm/Dl (Mean±S.D.) | LDL Gm/Dl (Mean±S.D.) | Triglyceride Gm/Dl (Mean±S.D.) | Hba1c G/Dl (Mean±S.D.) | Blood Glucose (Mean± S.D |
|---|---|---|---|---|---|---|
| **Control(A)** | 30 | 47.33±1.18 | 103.96±3.69 | 145.83±2.30 | 5.08±0.08 | 94.56±2.42 |
| **Diabetic(B)** | 30 | 45.96±1.35 | 142.2±1.79 | 183±7.94 | 6.24±0.12 | 157.9±5.31 |
| **Cider Vinegar(C)** | 30 | 46.56±1.24 | 116.83±2.97 | 146.56±2.06 | 5.35±0.8 | 111.73±3.07 |

Table 2 shows the result of biochemical parameters such as HDL, LDL, Triglyceride, HbA1c levels of the participants after consumption of apple cider vinegar.

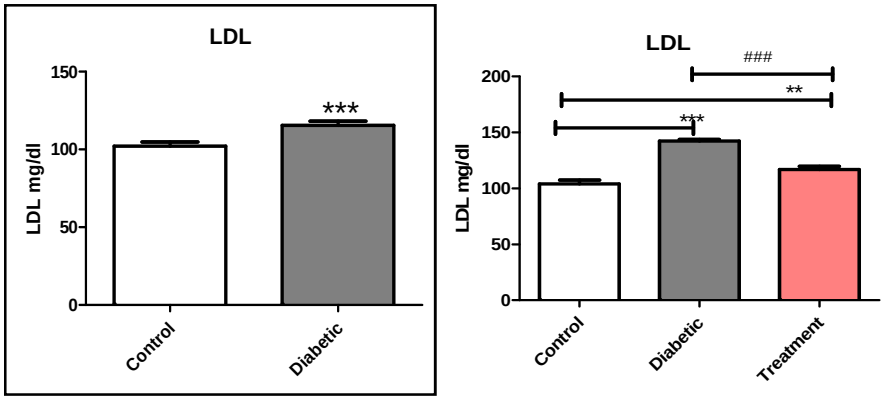



**(A)Baseline** **(B) After 2 Month**

**Figure 1: Comparison of High Density Lipo Protein Mg/Dl Level in Control, Diabetic & Treatment Group**

Figure1 shows that in A there was no significant difference between of the HDL Level, as compared to the control and diabetic.

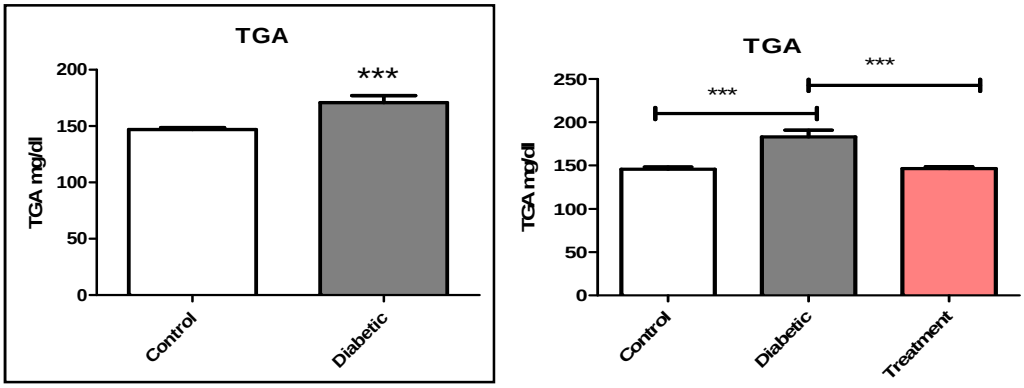
In B show after 2 month of the significant increases HDL in control group and almost equal in diabetic and treatment group.




(A)**Baseline** **(B) After 2 Month**

**Figure 2: Comparison of High Density Lipo Protein Mg/Dl Level in Control, Diabetic & Treatment Group**

The figure 1 2 shows that, in (A) their significantly increases LDL Levels in diabetic group as compared to control group. In figure (B), there is significant increase in the LDL Levels in Diabetic group, as compared to control group, but in comparison to treatment group with diabetic group, the LDL L level decreases in treatment group, as compared to control group slightly increase in treatment group.

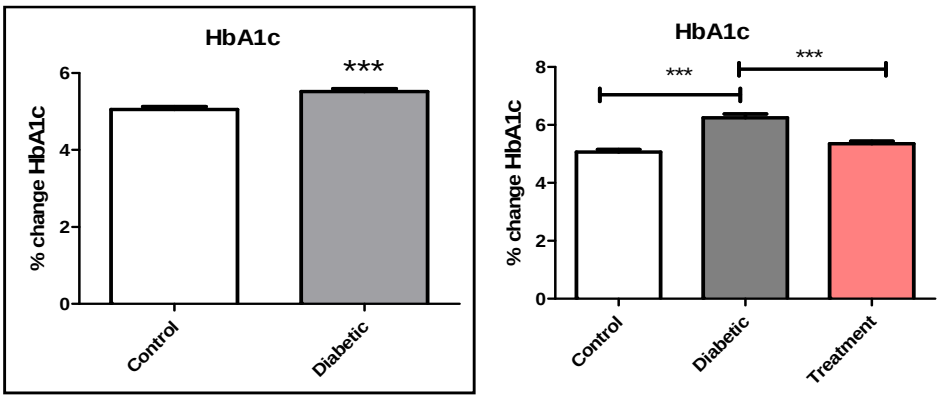



(A)**Baseline** **(B) After 2 Month**

**Figure 3: Comparison of Triglyceride Mg/Dl Level in Control, Diabetic & Treatment Group**

The figure 3 shows that in (A), the blood Triglyceride level significantly increases in diabetic group as compared to control group.

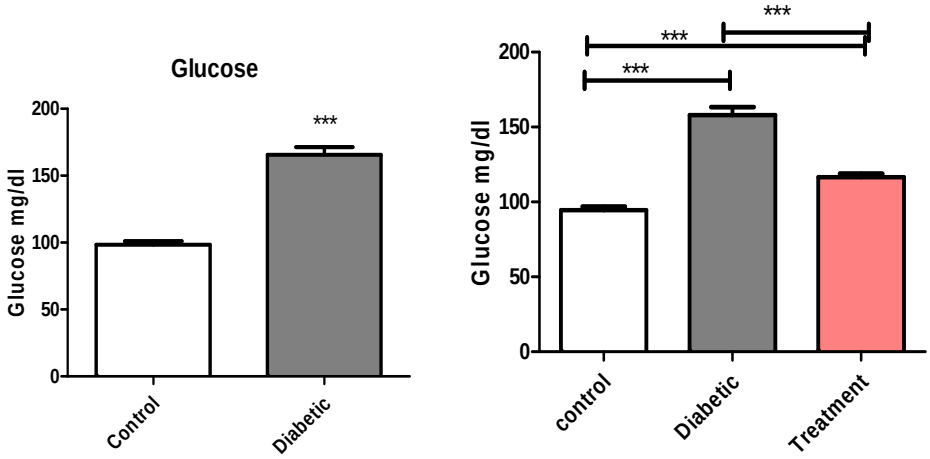
In figure. (B) The Triglyceride level of significantly increases, Triglyceride Level in the diabetic group as compared to control group and there is no significant difference between the control group and treatment group. There is significant reduction of Triglyceride level in treatment group as compared to Diabetic group.




**(A) Baseline** **(B) After 2 Month**

**Figure4: Comparison Table of Hba1c G/Dl Level in Control, Diabetic & Treatment Group**

The figure 4 shows that in figure. A the HbA1c level in blood significantly increases in the diabetic group as compared to the control group. In figure. (B) Shows that the significantly increases HbA1c level in the diabetes group as compared to the control group and there is a significantly differences between control and treatment group. There is significantly decline level of the treatment group.




**(A)Baseline** **(B) After 2 Month**

**Figure 5: Comparison of Blood Glucose Mg/Dl Level in Control, Diabetic & Treatment Group**

Figure.5 shows that in (A) significantly increases the glucose level in Diabetic group as compared to control group.

In figure. B significantly increase the glucose level in Diabetic group as compared to control group, but decreases in treatment group and in compare to the control group the treatment group (apple cider vinegar) slightly increases.

## CONCLUSIONS

This small study shows that apple cider vinegar in both concentration was effective after 2 month in type 2 Diabetic patient. daily consumption of Apple cider vinegar favourably influences the Different biomarkers as HDL, LDL, Triglyceride, HbA1c. On conclusion, the above results revealed that apple cider vinegar has got an exclusive antidiabetic property and help in preventing diabetic complications. Apple cider vinegar was most effective to decrease glucose, total cholesterol, triglycerides, LDL and increases HDL because of its higher concentration of organic acids and phenolic compounds.[1]

***REFERENCES***

1. ***Andrea M. White et.al. 2007*** *Vinegar Ingestion at Bedtime Moderates Waking Glucose Concentrations in Adults With Well-Controlled Type 2 Diabetes, Diabetes Care 2007 Nov; volume 30, issue (11),pp 2814-2815.*
2. ***Carol S. Johnston et.al. 2009*** *Preliminary evidence that regular vinegar ingestion favourably influences haemoglobin A1c values in individuals with type 2 diabetes mellitus. Volume 84, Issue 2, May 2009, Pages e15–e17 science direct.*
3. ***Christopher G. Bunick et.al****.Chemical burn from topical apple cider vinegar. Volume 67, Issue 4, October 2012, Pages e143–e144*
4. ***Carol S. Johnston et.al.*** *Vinegar lacks antiglycemic action on enteral carbohydrate absorption in human subjects, Volume 29, Issue 12, December 2009, Pages 846–849*
5. ***Derya Atik et.al.2016*** *the Effect of External Apple Vinegar Application on Varicosity Symptoms, Pain, and Social Appearance Anxiety: A Randomized Controlled Trial, Evidence-Based Complementary and Alternative Medicine, Volume 2016 (2016), Article ID 6473678, 8 pages.*

6. **Eleni I Petsiou et. al. 2014** *Effect and mechanisms of action of vinegar on glucose metabolism, lipid profile, and body weight, Nutritional Review (2014) volume 72, Issues (10), pages 651-661.*

7. **Komal Chauhan,** *I³-Oryzanol Improves Serum and Hepatic Biomarkers in Streptozotocin-Nicotinamide (STZ-NA) Diabetic Rats, International Journal of Bio-Technology and Research (IJBTR), Volume 6, Issue 4, July - August 2015, pp. 19-26*

8. **Johnston C.S et.al.2010** *Examination of the Antiglycemic Properties of Vinegar in Healthy Adults, Volume 56,74–79*

9. **Kahraman, N. Kuzeyl et.al. 2011** *The effect of vinegar on postprandial glycemia: does the amount matter, Acta Endocrinologica (1841-0987), Vol. 7 Issue 4, p577-584. 8p*

10. **Maryam Iman et.al. 2015** *Effect of Apple Cider Vinegar on Blood Glucose Level in Diabetic Mice. Original Research, pharmaceuticals science 2015, volume 20, issues 4, pp 163-168.*

11. **Mohammad shaabani et.al.** *Influence of apple cider vinegar on blood lipids, Life Science Journal 2012;9(4)*

12. **Mishra S.& Verma P. 2012** *Flexseed bioactive compounds and health significance, IOSR journal of humanities and social science (IQSR= JHSS) 17 (3) : 46-50.*

13. **MedGenMed et.al. 2006**, *Vinegar: Medicinal Uses and Antiglycemic Effect volume 8(2): 61.*

14. **M. S. Christine M. Ross et. al.** *The effect of apple cider vinegar on adjuvant arthritic rats, nutritionally research volume 4, issue 4, july-august 1984 pages 734-741.*

15. **Ravinder Singh et.al.2015** *Assessment of hypoglcemic effects of apple cider vinegar in type 2 Diabetes, DIABETES, e-ISSN 2320 –7876 www. ijfans.com , Vol.4, Iss.1, Jan-Mar 2015*